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Horses by a Pond is a 19-inch × 29-inch oil-on-canvas painted by British artist S. Joseph Clark circa 1860. Another painting by Clark, *Carthoses Drinking from a Brook*, was featured on the Nov 1, 1989 cover of the JAVMA.

Permission to reproduce the painting on this issue's cover was granted by Feigen, Inc of Chicago.

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Specialization in veterinary medicine: Where we've been and where we're going

John F. Fessler, DVM, MS; James K. Burt, DVM, MS; Richard R. Brown, DVM

Specialization is coming of age in veterinary medicine. By the year 2000, specialties will evolve as an important component of veterinary service to the consuming public, with referrals, consultations, and primary, secondary, and tertiary levels of patient care similar to that of human medicine today. In fact, the knowledgeable consumer will expect nothing less.

Specialists have been a part of the educational and institutional practice of veterinary medicine for several decades. Now, they are providing an evolving, maturing, ever-expanding component of private veterinary practice as well. The influx of specialists to private practice is viewed as desirable for the future, but it has the potential to create a disparate conglomeration of organizations representing bonified specialties, subspecialties (affiliates), pseudo-specialties, and special interest groups. The setting could become adversarial, compared with collegial, with a splintering of the profession and a detraction from quality assurance to the public. This would be a serious threat to a small profession that deals with multiple species as well as the usual medical disciplines and body systems, all in a tightly restricted economic framework. All veterinarians need to be informed about the current status of specialization in the profession, the historical developments, and the trends as they are evolving so that future actions and decisions can be informed, can reflect the body politic, and can result in consumer services that are in demand.

Specialization surfaced in 1950 when the AVMA Executive Board received applications for recognition from the first 2 speciality organizations, the American College of Veterinary Pathologists (Feb 10, 1950) and the American Board of Veterinary Public Health (July 31, 1950). In 1951, the AVMA House of Representatives approved the recognition of these 2 colleges and assigned the responsibility for future applications to the Council on Education. In 1957, the House of Representatives granted recognition to the American College of Laboratory Animal Medicine. The impetus for these early specialties, no doubt, was interest by veterinarians and demand by the public; now these 3 colleges are large, well-organized, influential groups in the profession.

The Council on Education subsequently recommended the establishment of the Advisory Board on Veterinary Specialties (ABVS). It met for the first time in 1960 and has been guiding the development and approval of the various colleges and boards ever since. The ABVS meets annually and is composed of delegates from each of the AVMA-recognized specialty organizations and a representative from the Council on Education. The ABVS exists for the expressed purposes of: furnishing advice and assistance to organizations submitting petitions for establishment and recognition as a specialty; evaluating and establishing criteria for specialty boards and determining that they meet the criteria, fill a recognizable need, and represent distinct specialization in veterinary medicine; and promoting and encouraging the enhanced utilization and availability of specialty services within the profession and to the public.[1] In carrying out these objectives, the ABVS reviews applications and reports, makes recommendations to the Council on Education, which are ratified by the House of Delegates, and serves as a mediator in disputes. In the past 30 years, the ABVS has been busy. It has grown from an initial committee of 3 to the present size of 19 members as represented by a delegate from each of the currently approved colleges and boards (Table 1) and a scientific advisor from the AVMA staff.

The strongest growth in colleges and boards has been in the clinical specialties. Just under 10% of all AVMA members are board-certified, but the number is growing rapidly. A singular motivation for obtaining board certification in a clinical specialty in the 1970s and early 1980s was the career goal of a faculty position. During that era, older veterinary schools were expanding, and newer schools were being established. There was a scramble for clinical faculty, and residency training with board certification was viewed as PhD-equivalent preparation for academe. Now, the expansion era

From the Committee to Promote Specialty Services, Advisory Board on Veterinary Specialties, AVMA. The ABVS has reviewed and endorsed this special commentary.

Table 1—Currently approved specialty colleges and boards

Name	Full Approval	Membership
Am Board of Vet Practitioners	1985	261
Certification in Companion Animal Practice		
Certification in Equine Practice		
Certification in Food Animal Practice		
Certification in Dairy Practice		
Certification in Feedlot/Cow-Calf Practice		
Am Board of Vet Toxicology	1970	77
Am College of Lab Anim Medicine	1957	379
Am College of Theriogenologists	1975	248
Am College of Vet Anesthesiologists	1981	85
Am College of Vet Dermatology	1986	47
Am College of Vet Int Medicine	1980	463
Certification in Cardiology	1980	
Certification in Neurology	1980	
Certification in Oncology	1988	
Am College of Vet Microbiologists	1968	219
Certification in Virology	1988	
Certification in Immunology	1988	
Certification in Bacteriology/Mycology	1988	
Am College of Vet Nutrition	1988 (provisional)	26
Am College of Vet Ophthalmologists	1974	126
Am College of Vet Pathologists	1951	965
Am College of Vet Preventive Medicine	1951	483
Certification in Epidemiology		
Am College of Vet Radiology	1966	132
Am College of Vet Surgeons	1970	394
Am College of Zoological Medicine	1988	22
Am Vet Dental College	1988 (provisional)	18
Am College of Vet Emergency and Critical Care	1989 (provisional)	19
Am College of Vet Clinical Pharmacology	1990 (provisional)	5

is over, and faculty positions are saturated. Yet, the interest in residency training and board certification persists for a variety of reasons: the ever-expanding volume and complexity of scientific information mandates a focused approach to career development; new graduates are seeking internships and residencies as suitable job opportunities in the professional pipeline; practitioners and the public are becoming increasingly suave about consultation and referrals, particularly regarding veterinary teaching hospitals and in metropolitan areas[2]; nationally based studies, such as the PEW educational initiative, have focused on specialization as a societally driven trend for the future[3]; board certification is becoming a requirement for certain jobs and/or a higher level of salary (eg, government service); and specialists are leading the way in the research, teaching, publishing, and practice of veterinary medicine. These time-honored signals of professional career development are the role-modeling magnets that attract veterinary students and new graduates to choose certain career paths.

The profession is in transition regarding the role of specialists in service to the public. On one hand, specialists have had the edge over nonspecialists in the faculty job market, but now this traditional opportunity has filled. On the other hand, specialization is here to stay and is forecast to expand.[2,3] Anywhere from 30 to 50% of clinical specialists are in practice and their numbers are growing. These specialists are establishing themselves in metropolitan-based group practices and, increasingly, in isolated solo locations. A strong correlation has been observed between the number of veterinarians working in a particular type of practice and the frequency of referrals to specialists outside that practice.[2] For practices employing 5 or more veterinarians, 70% of such practices refer cases to specialists outside the practice, whereas for practices employing only one veterinarian, only 33% of such practices utilize outside specialists.

A survey in January 1989, indicated that horse owners generally were more likely to be aware of the availability of specialists than were owners of pets or livestock.[4] Horse owners also were more agreeable to using specialists than were the other categories of animal owners. It was apparent from this survey that most people recognize the veterinary specialist because of their familiarity with medical specialties. The respondents in this survey believed that referral of cases would increase by 57% in small animal practice, 50% in food animal practice, and 37% in equine practice during the next 5 years.[4]

Veterinarians situated in densely populated areas tend to refer patients more frequently than do those serving less-populated areas, and without a fear of losing clients to specialists through the referral process.[2] However, the same survey indicated that almost half the respondents believe that the general public does not fully understand the role of specialty practices in the veterinary health scheme, wherein the general practitioner provides primary (preventive) care, clinical specialists in practice provide secondary care via referral, and university faculty members provide tertiary care in the form of research, prospective studies, and expensive technology that has limited availability.

These data indicate that specialty practice is

currently alive, well, and growing within the profession, particularly in metropolitan group practices. Yet, though it is growing, many specialists providing secondary care cannot make a living strictly from their referral cases alone. Another problem is that board-certified specialists can locate and are locating in less-urban situations, where there is client reluctance to be referred and fear on the part of primary-level practitioners of losing clients to specialists through the referral process. Specialists in these situations are forced to resort to primary care to make a living, adding to a vicious cycle of referral reluctance. These specialists are at risk of becoming disenchanted by their underutilization and of being over-educated and over-trained for their practice circumstance.

What are some of the issues of and answers to client reluctance and fear of client loss? How do we evolve in a positive, constructive way on behalf of the consuming public and the veterinary profession itself? Education and communication are the keys. Professional and nonprofessional awareness of the advantages of specialty referrals are areas needing emphasis and promotion. Already existent specialty colleges and boards and the AVMA must take the lead. The following are some of the issues and actions that have been taken recently or are under consideration.

In this day and age of marketing, every veterinarian is looking for an "edge," something that will set him/her apart in fostering a practice, suitable career development, and in obtaining personal security. In a profession that deals with multiple species, multiple body systems, and multiple medical disciplines, the distinction between "special interest" and bonafide specialization becomes blurred. A veterinarians's intention to represent his/her skills and knowledge to the public without misrepresentation as a specialist, if indeed he/she is not, leads to some honest mistakes. The fact that recognized specialties based on species, systems, and disciplines now exist has added to the confusion and the blurring of ethical boundaries for advertising. Everyone knows the meaning of "surgeon," "ophthalmologist," or "radiologist," and everyone knows that all DVMs are licensed to perform surgery, examine eyes, and interpret radiographs. The ethical mistake comes from promoting oneself in a species, system, or discipline specialty without appropriate residency training and certification. This is separate and distinct from limiting a practice to a particular species or activity, which has been and continues to be recognized as a professional choice for all licensed veterinarians. For clarification, the ABVS, the Judicial Council, and the House of Delegates of the AVMA recently have adopted guidelines for advertising and definitions for specialists:

A. Advertising and Directory Listings
   1. Veterinarians may legally advertise in any way that is not false, misleading, or deceptive. Advertising guidelines and interpretations are discussed in the AVMA Principles of Veterinary Medical Ethics in the 1990 issue of the AVMA Directory.
   2. Veterinarians should not in any way imply that they are specialists unless they are certified by an AVMA-recognized specialty board or college.
   3. Individual specialty organizations are encouraged to provide guidance to their members in matters pertaining to advertising or directory listing. For example, a diplomate of the American Board of Veterinary Practitioners, certified in companion animal practice, should choose from the following directory listing options:
      a. Diplomate, American Board of Veterinary Practitioners, certified in Companion Animal Practice, or
      b. Diplomate, American Board of Veterinary Practitioners (Companion Animal Practice).

   Or, a diplomate of the American College of Veterinary Internal Medicine certified in Cardiology should choose from the following options:
      a. Diplomate, American College of Veterinary Internal Medicine, certified in Cardiology, or
      b. Diplomate, American College of Veterinary Internal Medicine, (Cardiology).

Approved, AVMA
House of Delegates
July 1988

B. Definitions
   1. SPECIALIST–A veterinarian who is certified by a specialty college or board recognized by the AVMA.
      a. SYSTEM SPECIALIST–A specialist in a field that has its primary emphasis on a specific organ or body system within veterinary medicine (eg, ophthalmology, internal medicine, neurology). This field may involve various species and may involve various medical and/or surgical disciplines within the representative body system or organ, which is the primary area of specialization.
      b. DISCIPLINE SPECIALIST–A specialist in a field that has its primary emphasis on a particular discipline within veterinary medicine (eg, surgery, pathology, virology, radiology, preventive medicine & public health). This field may involve various species and may involve various body systems or organs within the representative discipline that is the primary area of specialization.
      c. SPECIES SPECIALIST–A specialist in a

field that has its primary emphasis on a particular species or group within a species within veterinary medicine (eg, laboratory animal medicine, zoological medicine, companion animal practice). This field may involve different medical and/or surgical disciplines and may involve various body systems or organs within the representative species that is the primary area of specialization.

Approved, AVMA
House of Delegates
July 1989

Conscientious adherence to these guidelines by all veterinarians, generalists and specialists alike, will help to unravel some of the blurring and confusion. A practitioner who limits his/her practice to canine orthopedics cannot advertise as a specialist. By the same token, a diplomate of the American Board of Veterinary Practitioners certified in companion animal practice cannot advertise as a surgeon.

Two different, but somewhat related problems have a bearing on the issues of misrepresentation and advertising, "board qualified/eligible" candidates and Charter Diplomate-status in emerging specialties. Veterinarians are successfully completing residency training programs in various specialties, but for any number of reasons they are failing to submit their credentials, complete the examination, and obtain certification in their respective college or board. These individuals are fully knowledgeable, trained, and experienced and are eminently qualified to take referrals and provide secondary-level service. However, they have not completed the certification process and cannot advertise as a specialist. The same dilemma exists in human medicine where, apparently, "board eligibility" has been viewed as an end point in itself and the physician has no intention of submitting to credentialing and examination. This has resulted in actions by the American Board on Medical Specialties in human medicine and the ABVS in veterinary medicine to disavow use of the terms board-eligible or board-qualified as indications of special qualifications because they are misleading to the public. The mentors of residency training programs would fervently hope that all their residents would complete the certification process, thus seeking the highest level of recognition as a specialist, but this is not the case. Veterinarians who have completed residency training but have not obtained certification will practice their "specialties" as do residency-trained but uncertified physicians. Because board certification is a voluntary process, there is no way to "enforce" completion of the credentialing and examination process in a democratic society.

The issue of granting Charter Diplomate-status has come under considerable scrutiny. Historically, charter status has been granted to professors of the specialty, individuals who have authored important publications resulting from teaching, research, or practice in the specialty and have had at least 10 years experience in the specialty. These Charter Diplomates have been well-known in the profession at large and are unquestioned regarding their motives and academic credibility. Recently, the ABVS has been in the position of having to discriminate between these patriarches of an emerging specialty and those of lesser accomplishments who are seeking the "edge" that was mentioned earlier.

It is axiomatic, with the emergence of any new organization, that someone must lead, and that worthy individuals will be overlooked; such is the nature of change and progress. The very establishment of specialties involves the setting of standards, even for the initiating Charter Diplomates. The responsibility for setting the standards and for making the hard decisions, those that impact on individual careers, begins with the organizing committee of a new specialty. These decisions are approved, modified, or denied by the ABVS. Fortunately, none of the 18 specialties currently in place have been approved expressly for the self-aggrandizement of its members, especially their Charter Diplomates. Quality assurance (ie, the provision of improved veterinary medical services) and the protection of the public from incompetence have been the overriding premises for specialty colleges and boards. Thus in 1989, the ABVS reaffirmed the long-established requirements for Charter Diplomate-status in a newly approved specialty. Such requirements are focused on excellence and expertise in the practice of the specialty, as evidenced by the authorship of important publications, academic title, and extended experience. Veterinarians who qualify as Charter Diplomates are expected to serve on the organizing committee of a new specialty, but not all members of the organizing committee will necessarily be granted Charter Diplomate-status per se. In other words, a veterinarian may contribute to the organization of an emerging specialty, but be premature for Charter Diplomate-status him/herself. Presumably, such individuals would be admitted to one of the earlier examinations when the new college or board was up and running. These reaffirmations and refinements of the definition of an organizing committee and the requirements for Charter Diplomates should improve the fairness and impartiality by which such decisions are made in the future. They are detailed in the Policies and Procedures Manual of the ABVS, which is available by request from the AVMA headquarters.[1]

It would appear that the awareness of specialties is growing among veterinarians and the general public, but their acceptance and utilization is low. Presumably, we are on the threshold of naturally increasing visibility and utilization as the number of board-certified specialists in practice settings

increases and the expectations of the general public rise. Dramatic advances in the profession have made it virtually impossible for every veterinarian to remain current with all of the emerging diseases in all species, or to be competent with all of the new techniques and complex instruments that are finding widespread application in veterinary medicine. Cost alone prohibits the universal availability of all knowledge and all technology in each practice setting. In a word, the James Herriot era of practice is over. Every veterinarian recognizes the need and the place for a second opinion; this is the genesis of a consultation or referral.

Communication and trust are the attributions between general practitioners and specialists that will lead to appropriate referrals and the best patient care. As outlined by the Council on Public Relations of the AVMA, the following ideas inculcate communication and trust and are encouraged on behalf of primary and secondary care givers. Primary care veterinarians in a position to refer patients must know about the training and expertise possessed by board-certified specialists and the unique equipment or technology they can provide. When a specialist enters practice in a given area, he/she should send announcements and business cards to the surrounding general practitioners indicating his/her special areas of interest and expertise and invite inquiries. Several of the specialty colleges and boards (medicine, surgery, ophthalmology) have developed brochures that define the qualifications of their members and the services available. There are consortia of board-certified specialists in certain parts of the country. The Ohio Association of Practicing Veterinary Specialists distributes a brochure giving the services, location, and disciplines of their members. The Association of Certified Veterinary Medical Specialists in California provides a toll-free number to support general practitioners and their clients in need of assistance. Such consortia and associations are expected to grow in numbers throughout the country.

Specialists in practice must assure surrounding practitioners that they will provide only specialty care, not routine primary-level veterinary services for the cases referred to them. Soon after the referral, the primary care veterinarian should expect a timely communication from the specialist about the findings, treatment, or procedures that are to be used. The specialist should complete the process by referring the patient back to the general practitioner for any follow-up requirements that befit the primary care setting, thank the practitioner, and reassure the animal's owner about the good judgement and serious concern that was shown by the referring veterinarian. Misunderstanding of expectations for diagnosis and treatment by the primary-care veterinarian and lack of communication and ethical courtesy by the specialist will destroy a potential referral liaison from the outset.

Primary- and secondary-care veterinarians must help themselves, individually and collectively through their local associations, consortia, and specialty colleges and boards, and not wait for national-level initiatives and public announcements. At this time, the specialties are not a large constituency within the AVMA; it would be unreasonable to expect the AVMA to allocate a disproportionate amount of time and resources to the issues of consultation and referral among veterinarians and wrong to expect it to mandate a system for ideal patient care. Such allocations and systems must evolve in the future on the basis of the people and expertise available within the profession and the expectations of the public, not on the basis of a centralized administrative mandate.

On the other hand, there are several initiatives within the AVMA that should foster quality assurance to the public that the veterinary profession is capable of providing. In 1989, the ABVS created a standing subcommittee to encourage the enhanced utilization and availability of specialty services to the veterinary profession and the public. This is a committee to promote specialties and to provide marketing initiatives. Beforehand, the ABVS was constituted to furnish advice and assistance, establish criteria, and evaluate and review applications. Now, the objectives have been expanded to include the promotion and utilization of specialties. In addition, the ABVS wants to have specialty acronyms (eg, ACVIM, ACVS, ACT, ACVO) added to the geographic listing of board-certified individuals in the AVMA Directory. In 1989, the telephone numbers of veterinarians were added to the Directory, which is distributed to all AVMA members. The combination of telephone numbers and specialty designations should make the Directory a universally available resource for consultation and referrals. Finally, the ABVS is on record with the Executive Board and AVMA officers that any marketing and promotional endeavors should include the role of specialization and practicing specialists in the media material.

What about the future? How is the ABVS/AVMA preparing to lead specialization into the next century, hopefully avoiding a disparate conglomeration of adversarial groups? With the intent of retaining the authority for establishing criteria for specialty boards and evaluating petitions for recognition, yet being of assistance, furnishing advice, and promoting and encouraging the utilization and availability of specialty services, the ABVS has approved several new policies and positions in the last 2 years to foster the orderly evolution of new specialties. First, the term "specialist" has been fully defined. Second, the ABVS has reaffirmed the requirements for Charter Diplomate-status in new specialties and has improved the definition of what constitutes the membership of an organizing committee. These 2 changes have been discussed.

Third, it is increasingly apparent that core

specialties (eg, medicine, surgery, radiology, pathology) are already in place in the veterinary profession and that new petitions frequently represent subspecialties that could be affiliated with one of the standing colleges or boards. For example, the oncology subspecialty petitioned successfully as an affiliate of the American College of Veterinary Internal Medicine in 1988. To this end, the ABVS has requested that all existing colleges and boards review their position regarding possible future subspecialties and alter their constitutions if necessary. Internal medicine has had an umbrella policy from the outset. The American College of Veterinary Preventive Medicine has recently recognized the subspecialty of epidemiology. In 1988, the American College of Veterinary Microbiologists recognized subspecialties in virology, immunology, and bacteriology/mycology. The American Board of Veterinary Practitioners currently recognizes companion animal, equine, and food animal practices; pending approval by the Council on Education and the House of Delegates this year, they will add dairy practice and feedlot/cow-calf practice. Other colleges are now considering such subdivisions and affiliations.

There are numerous advantages for new specialties to start out as affiliates. It takes money and leadership to write a constitution and petition the ABVS/AVMA for provisional approval, to put a committee structure in place, to establish residency training programs, to accept credentials and examine candidates, and to get the new college or board up and running. Established specialties have these mechanisms in place and are experienced with credentialing. To facilitate affiliations and to help new colleges and boards avoid the early difficulties of organization, the ABVS has established a policy that states that groups of veterinarians considering the formation of a specialty organization must submit a letter of intent at the earliest time, but at least one year ahead of the submission of a formal petition for recognition. After the filing of such a letter, 2 members of the ABVS will be assigned to the group to act as liaison and to instruct the group in preparing the petition. Representatives of the new group will be invited to attend the annual meeting of the ABVS at their own expense, wherein the liaison members will report on the progress of the group toward developing a petition. New affiliates can retain subspecialty status indefinitely. Or, with suitable growth and intensity, they can seek stand-alone status; the American College of Veterinary Dermatology started out as a subspecialty of internal medicine in 1980 and successfully petitioned for independent status in 1986.

The future for specialization in the veterinary profession is very bright. In many people's minds, it is the future, and all veterinarians have a stake in its orderly evolution. The form and function of specialization within the profession must provide quality assurance and be responsive to societal demand, yet befit a small profession with multifaceted responsibilities to a host of constituencies. Henceforth, the planning must be deliberate and the decisions must be wise.

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Prevalence and geographic distribution of Fanconi syndrome in Basenjis in the United States

Charles H. B. Noonan, DVM, and Jeffrey M. Kay, DVM

Summary: *A survey was conducted to ascertain the prevalence of Fanconi syndrome in Basenjis and to determine in which geographic regions the greatest number of affected dogs resided.*

A thousand questionnaires were distributed nationally, and 624 (62%) were returned. Through this survey, prevalence, geographic distribution, and breeder involvement were successfully correlated with the overall association of the disease with the Basenji breed.

Ten percent (96/959) of all Basenjis involved in the survey had Fanconi syndrome. Half (50%; 48/96) of the Basenjis affected were between 4 and 8 years old. Seventy-six percent (44/58) of owners of Basenjis with Fanconi syndrome were breeding their dogs, and 93% (52/56) had owned other Basenjis before the survey was conducted. Females outnumbered males (3:1) in frequency of the disease. This ratio reflected the higher breeder participation in the survey, rather than being a true gender predilection for the disease.

Unusual canine breeds often pose a series of challenges for even skilled veterinary practitioners. The Basenji is certainly no exception to this premise; several types of hereditary defects (eg, pyruvate kinase deficiency, Fanconi syndrome[1]) have come to be well-documented. Though the existence of an unusual breed might be nonsignificant quantitatively, the impact of a particular disease, genetic defect, or pathologic condition may be more pervasive than is generally appreciated.

Breeders and owners of Basenjis have become increasingly concerned with the perceived prevalence of Fanconi syndrome in this breed.[a] The purpose of the study reported here was to ascertain the actual prevalence and distribution of Fanconi syndrome in Basenjis.

From the Schulhof Animal Hospital, 199 Post Rd W, Westport CO 06880. Dr. Noonan's present address is 202 Weston Rd, Weston, CT 06883. Dr. Kay's present address is 92 Pilgrim Rd, West Hartford, CT 06117.

[a]Coe S, *Basenji Journal*, Newtown, Pa: Personal communication, 1986.

Materials and Methods

A thousand questionnaires were sent to breeders and owners of Basenjis throughout the continental United States. Six hundred twenty-four (62%) questionnaires were returned. Those surveyed were asked a number of questions concerning their experience with the disease, knowledge of the disease, experience with Basenjis, and involvement with breeding. To obtain the fullest possible response rate, complete anonymity was provided through a group[b] acting independently from the breeder group.

The prevalence of Fanconi syndrome in each state (Fig 1) was determined by the number of affected dogs reported for the entire survey. In addition to Fanconi syndrome, owners and breeders were questioned about several other diseases (eg, diabetes mellitus, chronic renal disease) that are known to have similar clinical signs of disease.

Results

One thousand fifty-one Basenjis were included in the 624 responses returned. Three hundred eighty-five (62%) responses revealed neither Fanconi syndrome nor any other diseases in the dogs. Such results were not unexpected, because approximately 61% (354/582) of these nondiseased Basenjis were ≤4 years old (Table 1). Sixty-four percent (229/358) of those who reported that their Basenji did not have Fanconi syndrome also had not bred their dogs (Table 2). Forty-nine percent (186/377) of this same group had never owned a Basenji other than the dogs reported in this survey (Table 2). However, 57% (221/386) did express an interest in actively breeding their dogs in the future (Table 3). This represents an issue of concern because it indicates that a large segment of those polled may breed affected dogs. Prior to this survey, 40% (156/386) of the owners in this category were unaware of Fanconi syndrome, and 89% (338/378) had never received any information from veterinarians regarding this potential risk to Basenjis.

The best-informed group was people who had Basenjis with Fanconi syndrome; 89% (48/54)

[b]Meriden Research Group, West Hartford, Conn.

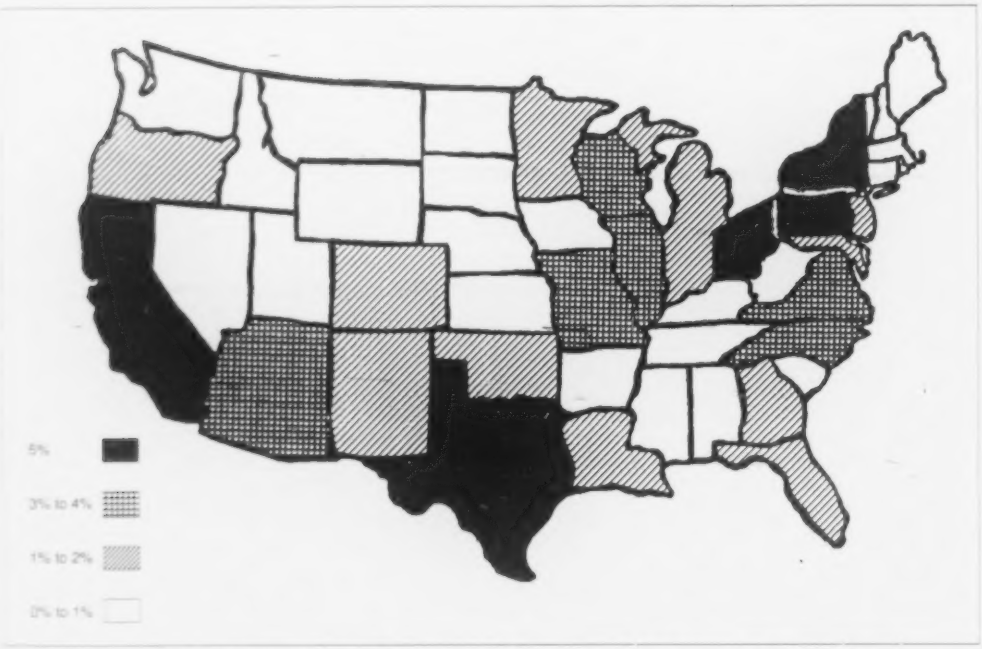

Figure 1—Geographic distribution of Fanconi syndrome and Fanconi suspect in Basenjis in the United States.

Table 1—Ages of all Basenjis included in the survey response

Response	Age in Years												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
No disease reported	92 (16%)	107 (18%)	91 (16%)	64 (11%)	54 (9%)	44 (8%)	27 (5%)	28 (5%)	19 (3%)	17 (3%)	8 (1%)	31 (5%)	582
Fanconi syndrome	8 (9%)	5 (5%)	7 (7%)	15 (16%)	12 (13%)	10 (10%)	4 (4%)	7 (8%)	4 (4%)	5 (5%)	9 (9%)	10 (10%)	96
Fanconi suspect	9 (13%)	10 (15%)	8 (12%)	6 (9%)	3 (4%)	5 (7%)	2 (3%)	4 (6%)	4 (6%)	6 (9%)	2 (3%)	9 (13%)	68
Other diseases	31 (15%)	37 (17%)	18 (8%)	18 (9%)	20 (9%)	7 (3%)	11 (5%)	11 (5%)	12 (6%)	14 (7%)	8 (4%)	26 (12%)	321
													959

Table 2—Quantitative overview of ownership patterns and involvement with breeding

Category	Have you owned Basenjis other than one(s) reported?		Are you currently breeding Basenjis?		How many Basenjis have you owned prior to this survey?				
	Yes	No	Yes	No	1 dog	2 dogs	3 dogs	4 dogs	5 or more
No disease reported	191/377 (51%)	186/377 (49%)	120/358 (34%)	229/358 (64%)	30/151 (20%)	31/151 (21%)	19/151 (13%)	16/151 (11%)	55/151 (36%)
Fanconi syndrome	52/56 (93%)	5/56 (3%)	44/58 (76%)	14/58 (24%)	2/54 (5%)	2/54 (5%)	5/54 (9%)	9/54 (17%)	36/54 (67%)
Fanconi suspect	37/38 (97%)	1/38 (3%)	18/38 (47%)	20/38 (53%)	8 (22%)	3 (8%)	2 (5%)	3 (8%)	21 (57%)
Other diseases	86/122 (70%)	36/122 (30%)	54/123 (44%)	69/123 (56%)	21/81 (26%)	12/81 (15%)	6/81 (7%)	7/81 (9%)	35/83 (43%)

knew of the disease, and 78% (45/58) had discussed the problem with their veterinarian (Table 3). A breakdown of the ages for affected Basenjis is seen in Table 1. Seventy-six percent (44/58) of respondents whose dogs had Fanconi syndrome currently breed their dogs (Table 2); 81% (47/58) of this group indicated that they will continue to breed Basenjis (Table 3). This group was quite consistent in its reporting of clinical signs of the disease usually observed. Females were affected more often than male (3:1). This result can be attributed to the practice of breeders retaining the female offspring for reproductive purposes and should not be misconstrued as a genetically expressed gender predilection of Fanconi syndrome.

The Fanconi "suspect group" was designated

Table 3—General information and background regarding Basenji owners

Question	No disease reported			Fanconi syndrome			Fanconi suspect			Other diseases		
	Yes	No	Unsure	Yes	No	Unsure	Yes	No	Unsure	Yes	No	Unsure
Prior knowledge of Fanconi syndrome before this survey?	224/386 (58%)	156/386 (40%)	6/386 (2%)	55/58 (95%)	3/58 (5%)	0/58 (0%)	25/39 (64%)	14/39 (36%)	0/39 (36%)	98/128 (77%)	29/128 (22%)	1/128 (1%)
Veterinary consultation if potential clinical signs observed?	27/242 (11%)	212/242 (88%)	3/242 (1%)	48/54 (89%)	6/54 (11%)	0/54 (0%)	23/36 (63%)	12/36 (14%)	1/36 (3%)	108/126 (86%)	18/126 (14%)	0/126 (0%)
Had veterinarian informed you of this syndrome before survey?	38/378 (10%)	338/378 (89%)	2/378 (1%)	45/58 (78%)	13/58 (22%)	0/58 (0%)	7/37 (19%)	30/37 (81%)	0/37 (0%)	39/127 (31%)	86/127 (68%)	2/127 (1%)
Do you breed dogs or would you consider becoming a breeder?	221/382 (58%)	49/382 (39%)	12/382 (3%)	47/58 (81%)	11/58 (19%)	0/58 (0%)	23/38 (51%)	14/38 (36%)	1/38 (3%)	84/126 (67%)	41/126 (32%)	1/126 (1%)
Would you want a quick, inexpensive test for syndrome?	353/388 (91%)	15/388 (4%)	20/388 (5%)	58/58 (100%)	0/58 (0%)	0/58 (0%)	37/40 (93%)	0/40 (0%)	3/40 (7%)	122/126 (97%)	0/126 (0%)	4/126 (3%)

Table 4—Owner observations of clinical signs of disease in Basenjis of the survey

Sign	No disease reported			Fanconi syndrome			Fanconi "suspect"			Other diseases		
	Yes	No	Unsure	Yes	No	Unsure	Yes	No	Unsure	Yes	No	Unsure
Polydipsia	25/385 (7%)	332/385 (86%)	28/385 (7%)	54/58 (93%)	3/58 (6%)	1/58 (1%)	24/40 (60%)	14/40 (35%)	3/40 (5%)	46/130 (35%)	77/130 (59%)	7/130 (5%)
Polyuria	16/381 (4%)	343/381 (90%)	22/381 (5%)	54/58 (93%)	3/58 (6%)	1/58 (1%)	19/38 (50%)	13/38 (30%)	6/38 (18%)	55/130 (42%)	66/130 (51%)	9/130 (7%)
Inappropriate urination	16/365 (4%)	337/365 (92%)	12/365 (3%)	46/58 (79%)	9/58 (16%)	3/58 (6%)	14/40 (34%)	21/40 (59%)	3/40 (6%)	36/128 (28%)	88/128 (69%)	4/128 (3%)
Polyphagia	34/379 (8%)	335/379 (88%)	10/379 (3%)	8/58 (14%)	45/58 (78%)	5/58 (8%)	6/39 (15%)	27/39 (69%)	6/39 (15%)	37/128 (29%)	83/128 (48%)	8/128 (6%)
Change in coat	52/384 (13%)	324/384 (84%)	8/384 (2%)	40/58 (69%)	18/58 (31%)	0/58 (0%)	19/36 (53%)	17/36 (48%)	0/36 (0%)	75/130 (57%)	52/130 (39%)	5/130 (4%)
Weight loss	42/385 (10%)	336/385 (87%)	7/385 (2%)	46/58 (79%)	11/58 (19%)	1/58 (2%)	21/39 (53%)	17/39 (45%)	1/39 (2%)	62/128 (48%)	65/128 (51%)	1/128 (1%)
Decreased activity	23/381 (6%)	350/381 (92%)	8/381 (2%)	39/58 (69%)	17/58 (29%)	2/58 (2%)	15/39 (38%)	23/39 (58%)	1/39 (4%)	59/128 (46%)	64/128 (50%)	5/128 (4%)

on the basis of comments and observations furnished by breeders and owners. This information was primarily anecdotal; thus, definitive diagnosis of Fanconi syndrome could not be established. However, the considerable number of such responses did warrant a specific category. A comparison of the responses for both categories (Tables 1 and 4) reveals distinct discrepancies between them. In particular, the reported age of onset was quite different, and the owners' observations of clinical signs of disease in dogs listed in the Fanconi suspect category were less consistent with those of the dogs affected by Fanconi syndrome. The suspect category may be partially explained by the nature of Fanconi syndrome, which is that of an infrequently diagnosed disease in an uncommon breed.

One hundred thirty-four responses revealed other important diseases in addition to Fanconi syndrome in the Basenjis of the survey. Among those diseases most frequently described were hypothyroidism (28%, 38/134), diabetes mellitus (9%, 12/134), malabsorption syndrome 9%, 12/134), and urinary tract infections (7%, 10/134). Seventy-seven percent (98/128) of this group was well aware of Fanconi syndrome, yet 68% (86/127) stated that their veterinarian had not discussed the problem with them (Table 3). The number of hypothyroid Basenjis was unusual and may warrant further investigation.

Through results of this survey, the geographic distribution of Fanconi syndrome in Basenjis has been determined (Fig 1). The lack of reports of Fanconi syndrome in Basenjis of a particular state must not be interpreted as that region being free of the disease and may be attributable, in part, to the limited prevalence of the breed in some areas of the country. The 5 states reporting the greatest number of affected Basenjis were California, Texas, Pennsylvania, New York, and Ohio—their sum equaled 40% of the total. The pattern in which the disease disseminates to the contiguous areas of these 5 states was interesting.

Discussion

Since 1976, renal tubular dysfunction (Fanconi syndrome) has been well-documented in Basenjis.[2] In people, the condition of paradoxic glycosuria in association with normal blood glucose concentration was first reported in 1931.[3] Research by others[2-4] has contributed considerably to greater understanding of this pathologic phenomenon.

Transmission of Fanconi syndrome is believed to be genetic (a simple Mendelian recessive trait in people), and can be considered a recessive late-acting lethal gene,[5] because of its appearance in mature Basenjis 3 to 8 years old. Other causes for renal tubular dysfunction in people include Wilson's disease, heavy metal poisoning, neoplas-

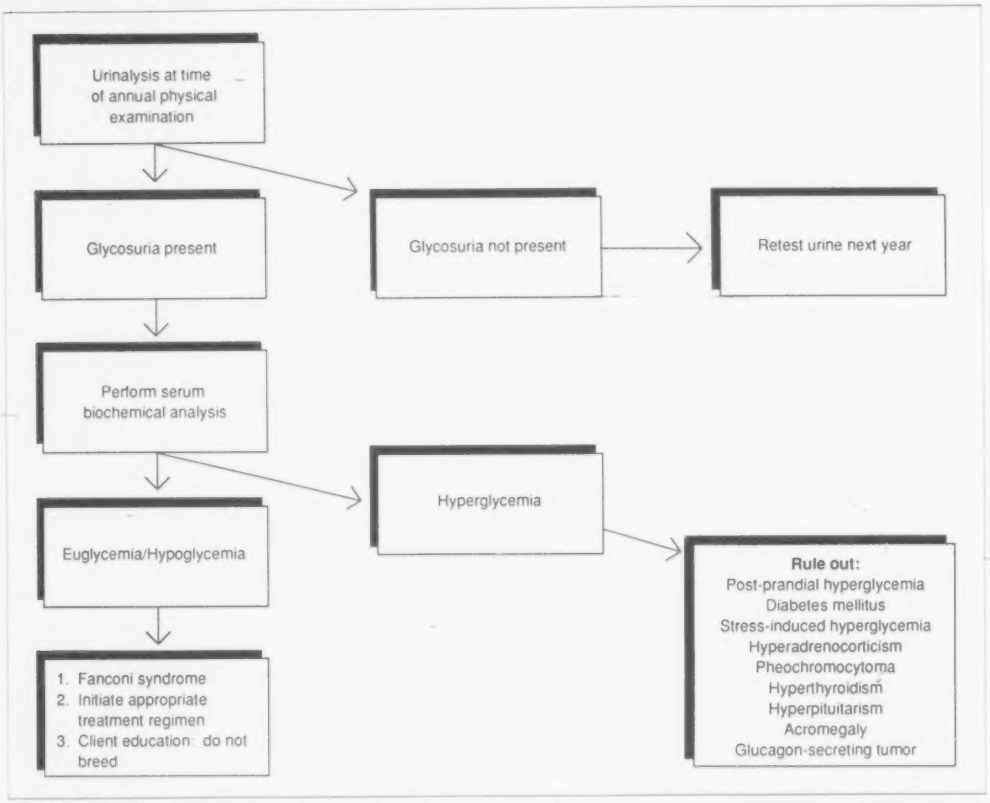

Figure 2—Recommended paradigm for diagnosing Fanconi syndrome.

tic disease, hypergammaglobulinemia, and nephrotic syndrome.[6]

The proximal renal tubules of the kidney perform many functions, including the reabsorption of electrolytes, amino acids, glucose, bicarbonate, and phosphate. The hydrostatic pressure within the glomerulus results in these compounds passing into the tubules.[7] The lack or impairment of this function adversely affects overall homeostasis and will result in a series of distinct physical signs of disease and clinical laboratory findings.

Clinical signs of Fanconi syndrome most often reported in Basenjis are polydipsia, polyuria, dehydration, weight loss in the presence of normal appetite, changes in coat, and decreased activity[2,4,8] (Table 3). Clinical laboratory results usually indicate glycosuria with normal blood glucose concentration, generalized aminoaciduria, proteinuria, hyperphosphaturia, and metabolic acidosis[2,4,8,9] Diseases to be ruled out when considering Fanconi syndrome include diabetes mellitus, diabetes insipidus, and renal disease. The prognosis for dogs with Fanconi syndrome is poor, and affected dogs should be treated similarly as dogs with other types of progressive, irreversible (ie, end-stage) renal failure.[4,9] The diagnostic scheme provided in Figure 2 offers an orderly approach for diagnosing Fanconi syndrome.

The insidious and occult nature by which Fanconi syndrome is transmitted poses considerable problems for breeders and veterinarians. Genetic counseling,[10] cautious breeding, and regular monitoring of the urine for glucose are necessary steps in arresting transmission of this disease. When considering the disease, clinicians should appreciate the importance of achieving a definitive diagnosis through which affected "blood lines" can be identified and continuation of such may be prohibited. Despite the poor prognosis, the breeder/owner should be fully apprised of the necessity for pursuing a thorough inquiry. According to this survey, Basenji breeders and owners will support these efforts and are growing more aware that this is a problem that must be addressed.

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Book Review: Scientific Alternatives to Animal Experiments

This book has been divided into 5 sections, each section consisting of several essays (or papers), the works of 30 authors. The essays were translated and edited from German to English by scholars, using British spellings and idioms. There are about 250 pages with 211 references (105 in English and 106 in German) and 11 pages of elementary medical glossary terms. The book's typeface appears to have been electronically produced and is very small. There are about 20 small illustrations rendered as mediocre line drawings and fuzzy cartoons that are provincial in their humor, if not illustrative of some principle. There are 5.5 pages of index containing about 200 entries.

According to the editor, Dr. Fred Lembeck (MD), there are 2 goals or "aims" for this book: to clarify the role of the animal experiment in modern medical science and to give insight into possible alternative methods to animal experimentation. In my opinion, the book is for a non-scientist audience; indeed, few definitions in the glossary would be needed by any modern veterinarian.

The very title of the book, *Scientific Alternatives to Animal Experiments*, should arouse great interest in diverse (perhaps adversarial) groups that might either be for or against the use of animals for purposes of research in an ongoing controversy. However, for the American veterinarian, regardless of which posture one takes in this controversy, the book falls short of certain contemporary standards expected of professional reference texts. For example, the 30 authors' credentials or institutional affiliations are not cited, leaving their credibility unknown. The rather minimal number of references provided at the end of each of 37 papers in the book would more usefully have been annotated by subject and placed in one section at the end of the book. The index is limited. For example, the page number for the pivotal definition of this book, 'alternative methods,' is not cited in the index at all (it is on page 1 in the introduction).

The basic tenor of the book recognizes the need for animal use in biomedical research, but (perhaps) less assertively acknowledges the historical evolution toward a number of alternative methods that have replaced animals for some kinds of research.

I recommend *Scientific Alternatives to Animal Experiments* for reference libraries at the American high school or junior college level. It should also be of interest to American research veterinarians who wish to compare attitudes toward biomedical animal experimentation in Europe with those in North America.—*[Scientific Alternatives to Animal Experiments, Edited by Fred Lembeck. 247 pages; illustrated. Ellis Horwood Ltd, Chichester, England. 1989. Available in USA from Routledge, Chapman & Hall, 29 W 35th St, New York, NY 10001. Price $74.]*—CHARLES J. SEDGWICK